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INTERFERENCE PROTECTION

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(9:09 a.m.)

MS. VAN WAZER: My name is Lauren Van Wazer and I'm Deputy on the Spectrum Policy Task Force. I'd like to welcome you to the second in a series of four workshops addressing spectrum policy issues.

This workshop will address interference protection. I'd like to say that we're providing sign language interpretive services. If there's anyone who would like such services, please identify yourselves.

(Pause.)

With that, I'd like to introduce Dr. Paul Kolodzy, Director of the Spectrum Policy Task Force.

DR. KOLODZY: Good morning, and welcome everybody to our second of four workshops that the Spectrum Policy Task Force is running on our investigation of new ideas and concepts for looking to the future for spectrum policy.

Yesterday, we had a wonderful workshop

on license spectrum and experimental licenses and we had a lot of interaction between the audience and the panelists and I'm looking forward to that same kind of interaction today. In fact, I think they set the bar fairly high for this panel to try to reach to try to maintain this type of interaction. I think those kind of interactions provide us better insight into issues and ideas that are out there in the community that we might be able to draw upon on some of our thought processes.

Let's put the first slide up. Whoops. Looks like you don't have my briefing slides.

Let me just do it extemporaneously. First of all, the Spectrum Task Force, this is the second out of four workshops. The first workshop again, like I said, yesterday, was on license and experimental. Today is on interference, a very interesting and very important topic. In fact, if you look at most spectrum issues that come up within the Commission and industry, it all boils down to a lot of interference and the issues

associated with how to define it, how to determine if somebody has been harmfully interfered with or not and how to prevent it. So this group will try to actually address many of those issues.

We'll have a workshop again on Monday, the Monday workshop will be on spectrum efficiency and ideas of how to actually get more efficient use of the spectrum and what kind of ideas and policies that might want to be looked at for new efficient methods of using the spectrum.

And the final workshop will be on August 9th, Friday, and that will be looking at spectrum rights and responsibilities and that will actually take a look at what kind of models and what kind of ideas you look at in a sense of how to define rights and responsibilities for spectrum users.

The reason this task force was put together is first of all, it was started by Chairman Powell, announced in June, and basically it was trying to look at how to look across the entire spectrum and ask the question are there

better ideas to take us into the realities of the 21st century. And we have tried to look not across just a single domain, but actually, we try to look across all the uses. And so therefore, I think you see in the panels you see today and from yesterday and the future, we have all the different uses and users and representatives from those groups here to discuss these important topics.

The task force is organized with myself and Lauren Van Wazer as my Deputy. Special Counsel is Maureen McLaughlin and Senior Technical Advisor is Mike Marcus. The Task Force Council is made up of senior folks across the bureaus that deal with spectrum policy and management issues from the International Bureau, from the Wireless Telecommunications Bureau, and from the Media Bureau. Also, the Offices of Plans and Policy and the Office of Engineering and Technology are also represented. So therefore, we have a very, very diverse group. And in fact, you're going to see today that our panel co-moderators are also one from each of those organizations, so you can

actually see they're represented quite well today.

The focus of today's meeting again is on interference and what I'd like to do is welcome everybody here and try to actually promote interaction. And I'm going to continue to say that and if I don't see interaction, I'm going to try to promote it myself from the sideline.

What I'd like to do now is introduce a lot of the moderators and co-moderators today. First, I'd like to introduce Dale Hatfield. He's now a private consultant, but I think that most everybody here knows of his background, both in industry, academia, as well as government and both being at NTIA and being the Chief Engineer and head of OET here prior to last year, I believe. He is co-moderator -- his co-moderator is Keith Larson who is the Chief Engineer of the Media Bureau. And he will be co-moderating this first panel.

The second panel will be co-moderated by Mr. Brian Woerner and he is from Virginia Tech and his co-moderator will be Ron Repasi who is the Assistant Chief of Engineering in the International

Bureau.

And this afternoon, our final panel will have Charles Jackson, Chuck Jackson from Jackson Telecommunications Consulting and his co-moderator within the FCC will be Tom Stanley who is the Chief Engineer of the Wireless Telecommunications Bureau. So you can see a lot of technologists here trying to actually talk about a very interesting and very contentious topic which is interference protection.

And with that, I don't want to hold up this group any longer. What I'd like to do is hand over the microphone to Dale Hatfield, because he has some introductory remarks to try to put some context around this workshop today.

Thank you.

MR. HATFIELD: Thank you very much, Paul. It's really nice to be back here at the Commission. I really appreciate your inviting me to co-moderate the panel today and I also, of course, want to add my thanks to the panelists for coming here and helping us out.

I honestly and sincerely believe that this panel topic is probably the most important of all because it underlies everything else. It's very clear that if we're going to accommodate millions of new devices, new systems and so forth, that we're going to all of us have to cope with additional levels of interference and that just seems to be a given. And how we define, how do we live with this increased interference and it seems to me the devil is in the details. It's easy and I've done this, I'm guilty of this as saying well, gosh, the secondary market would work a lot better if we have a more clearly defined set of rights and everybody can nod and say yes, that's certainly true and I'll invest more if I have a clear defined set of rights and so forth. Here again, that's absolutely true, but where it gets difficult and that's where economists tend to look at us engineers and say, okay, define those rights. As my good friend and colleague here, Bruce Franca says, you know, that's the hard part. That's the hard work.

I hope we'll address that issue today, how do you get more specific?

Clearly, I won't invest in my house if the state can come in and seize the property any time it wants to. I won't invest in my house if somebody can come in and take over a bedroom and not pay rent and so forth. So clearly, there's economic incentives that depend upon the rights that I have. I won't invest in new spectral efficient technology if the benefits of my investment then accrue to someone else probably.

These are all things that go what, go back to that defining that spectrum protection that I have, what rights I have. And as I said before, I won't buy and sell on a secondary market unless I have a pretty good idea of what I'm buying and what I'm giving up when I sell. Here again, coming back to the importance of getting these rights defined properly.

I've been thinking about this. In fact, I commented here before that one of the troubles of being an old man is it's difficult to

think of something new to say that I haven't said before, but let me say it anyway because I've come -- after I was here at the Commission again for three years, I've really come to believe that we have to think a little bit more about the receiver side. The longer I was here, it's kind of not a transmitter problem, it's really -- the things that held us up, the things that I held dear that I was trying to push here, generally speaking, that I thought were good policy, were held up, what, because of receiver problems. So I think reluctantly, in my mind, I think we have to come around and think more about the receiver side. In other words, two things. On the transmitter side, I'm saying the obvious and on the transmitter side, how much interference I'm allowed to produce, but on the receiver side how much interference am I obligated to be able to absorb?

Coming at it sort of from a different standpoint, I sort of look at trying to solve the spectrum problem, the congestion problem in sort of four ways. We have four alternatives, if you will.

One is reallocation. The second is more efficient use of the spectrum. The third is more sharing and the fourth is Mike Marcus' favorite and that's to go up higher in frequency. And I think as a society, we're going to have to use all four approaches. And spectrum, the interference protection applies as a role in all of those, but it's particularly important in the sharing area and when we talk about sharing I sort of divide the sharing ideas into three parts. First is, voluntary sharing. That's where I come to my Keith. He owns some spectrum and I say Keith, you know, here's this super new software-defined radio that tunes for light and I'm going to be able to operate at a power. I know where I am, I know where you are. I'm not going to cause you interference and you say gee, that sounds like a great idea. Give me $10 million and I'll be glad to share with you. And that -- okay, that's a voluntary sort of sharing. But here again, as I said before, I probably sound like a broken record, that depends upon us being able to negotiate

something in terms of what rights, what my rights are and what his rights are and our corresponding obligations.

The other is, of course, involuntary sharing and that's where it really gets sticky is when I paid for spectrum at an auction here, what bundle of rights were conveyed to me and then later on, the Commission says oh Dale, by the way, even though you paid for it, we want you to share with somebody else. Here again, it comes back to that set of rights, what rights were conveyed to me and how do we go about distributing. In other words, if I've got four dB of extra margin, and the Commission says okay, you've got to give two dB of that margin to fit in somebody else. Here again, what are the rights involved? What is the interference protection that I'm entitled to. And of course, the sort of third way of sharing here is I don't have a good name for it, but it's the -- it's sort of the de minimis sort of sharing saying that I'm going to operate devices like Part 15 devices that are at such low power that they won't

cause interference. Sort of using my property analogy, you know, the airplane is at 50,000 feet flying over -- it's flying over my property, but it's not bothering me. Or, in Colorado, where we come from we sell mineral rights. Mineral rights are conveyed separately from the property rights, so I don't own the mineral rights where my house sits on and you know, somebody could be mining coal underneath my house 300 or 400 feet down and it wouldn't bother me, and so that probably is not infringing on my ability to enjoy my property on the surface.

Well, I think I've droned on long enough, but what I think -- one of the points I was trying to make is that these interference rights, how you define it, how you deal with it and so forth, it's just critical, no matter whether you're sort of

market-oriented in your approach to spectrum management or you think what we need to do is a better job of engineering using traditional methods or whatever.

Thank you.

MR. LARSON: Thanks, Dale, for giving us a clear perspective here on what we're going to talk about today. Good morning, ladies and gentlemen. I'm Keith Larson and I too, have a few opening remarks.

I'm privileged to lead the Task Force's Interference Working Group. This is a multi-bureau, multi-disciplinary group of hard-working men and women. We have some engineers. We have some lawyers and economists, at least one economist. There are some of us who have been around the Commission quite a while and seen a lot of things happen and I'm pleased to say we have some very bright younger people as well, the future engineering brain trusts of the Commission and I think it's good to get them involved right away in some of these difficult issues.

I was looking around the room here. I think this is a historic occasion. In the building, not in the room, but in the building, I believe we have as many as five individuals who at

one time or another have run the Commission's Office of Engineering and Technology. Now that's historic. For engineers at the Commission, that's kind of like when all -- ah, we have another one. That's kind of like

-- that's kind of like when all the former Presidents get together for an occasion for a photo op. Where's my camera? But will all of you in the room who are either a current Chief Engineer, Ed Thomas or former Chiefs, raise your hands. Okay. Not me. Great. Thank you.

All right, the word interference came up quite a bit in yesterday's unlicensed and experimental workshop. And interference is all we're going to talk about today. It's a complicated thing. On the one hand, unwanted interference is something that nobody likes. It sometimes can be a nuisance. Other times it can be terribly economically destructive and even life threatening. Yet, interference is a hard thing to get your arms around because of its many variables. Several of these were talked about in one of

yesterday's sessions. There's the dimensions of time, space, geography, coding in a digital environment and I would add things like frequency, receiver performance, transmitter power and height, wave form, the effects of multiple emitters, the compounding effects of noise, weather and our atmosphere. And as the result of increasingly sophisticated transmitter and receiver technology, with the ability to detect and adjust for signal degradation, I think interference management is also going to increasingly have an economic dimension, a balancing if you will, of technical and economic factors.

Interference can be an elusive thing to its victims who may realize that something isn't quite right, but don't know what's going on. Let me illustrate here. As a kid growing up in northern Minnesota back in the 1950s and 1960s, we got our first TV set, I think in 1956, a black and white set. And the station we watched was about 100 miles away. And the picture was always snowy. Okay? And so we cultivated the fine art of

picking the people out of the snow back in those days. However, sometimes there was more snow on the screen than on the ground in the Minnesota winter and so we got out the playing cards. The point of all of this is that we were content with just getting a passable picture, the only kind of picture we'd ever known. When things got really bad, we didn't know what was going on. We suspected it had something to do with the great distance to the TV station, but we didn't know. We don't know whether my Dad got stuck with a lemon TV, whether the weather was the culprit or whether some kind of an interference was the problem like our next door neighbor running the vacuum cleaner or something. And like many other people, we never complained about it. We just lived with it.

I think those days are long gone. People now have access to much more reliable communications services, high technical quality services. I think folks are probably less tolerate of signal degradation and outages. Interference is very serious business.

Moreover, the Communications Act directs the Commission as the public interest requires, to make regulations that it deems necessary to prevent interference between stations.

Historically, various approaches for dealing with interference have evolved for each of the many Commission radio services, typically based on the expected use and technical characteristics of the time the services were created.

When I joined the Commission a wile back, I think there was something like 70 different radio services and they all had their own interference characteristics. And now, of course, there are even more services. Some of the approaches that are involved and our working group, the first thing they did was to go through the rules, canvas the rules and kind of create a matrix of all of the interference approaches that are used for the different services.

Common approaches involve limits on transmitter power and out of band emissions, but there are a whole bunch of other things. There are

signal strength limits that service area boundaries, distance separates between stations; prescribed minimum desired/undesired signal strength or carrier interference ratios. Negotiated interference agreements are often relied upon as is industry frequency coordination.

I would also point out that interference is going to continue to be serious business here at the Commission. The Commissions draft strategic plan for the Years 2003 to 2008 include as a spectrum policy objective, the vigorous protection against harmful interference.

The panels in today's workshop are designed to explore different aspects of what we generically refer to as interference management. The panel here this morning will probe for problems with current approaches and generally consider how the Commission should deal with future challenges, the kind of challenges that are presented by Moore's Law and the rapidly changing world of diverse and highly dense emitters.

The second panel this morning is going

to focus on the extent to which we might get some relief from advanced technologies. And the afternoon is going to look at other ways that the Commission can better manage interference, recognizing that interference impact affects not only spectrum policy decisions at the Commission, but also the Commission's licensing and enforcement activities.

So I would encourage you all to stay for all three panels.

The format this morning and for the other panels is going to be entirely interactive. A moderator will ask the panelists to respond to one or two questions in a topic area and following that, the audience will have an opportunity to ask questions or otherwise join the discussion, after which we'll move on to another line of questions. And as Paul mentioned, we encourage and we expect a lively and robust discussion on these issues.

Now let's meet our distinguished panelists. On my far left we have Andrew Clegg. Andrew is from Cingular Wireless. He's the lead

member of the technical staff there. And I guess, Andrew, you're kind of representing the wireless industry on the cell side.

Next to Andrew we have Rebecca Cowen-Hirsch from the Department of Defense.

Next to Rebecca, we have Glen Nash who is the President of APCO International, the public safety group. He speaks for the public safety issues.

Then over to Dale's right is Rob Briskman who is with Sirius Radio a digital satellite radio service and Rob has satellite background here nd he's going to be representing the satellite industry.

Then we have Paul Steffes from Georgia Tech University. He's a Professor there. And he was the, I believe, Paul, if I'm not mistaken, you were the past chair of the Committee on Radio Frequencies. Right. He represented radio astronomy interests there in that former capacity.

And then on Paul's right we have Larry Miller who is the President of the Land Mobile

Communications Council. Larry is also the Frequency Coordination Manager for the American Association of State Highway and Transportation Officials.

On Larry's right is Lynn Claudy. Lynn is the Senior Vice President of Science and Technology at the National Association of Broadcasters. And Lynn represents the interests of radio and television broadcasters in this country.

All right, panelists, ready to rumble here? Before looking at the future challenges of the Commission here involving interference management, I'd like just to start with the present. From your point of view, are there spectrum uses or users for which the Commission's current interference management approaches are either working relatively well, in fact, or are there are others for which the interference rules and processes are either not working at all or are being overly stressed by user demands?

Let's start with you, Glen, on that. How is it going on over there in the public safety

world?

DR. STEFFES: In general, it's going fairly well. The interference rules really require cooperation amongst the parties to get together and agree to work out their problems. We have a frequency coordination process that emphasizes minimizing the potential for interference and for public safety, it really is critical that we not have interference situations.

Having said that, we currently do have a very serious interference problem at the 800 megahertz band that arose out of a well intentioned Commission action in the early 1980s to interweave the spectrum and have various groups trying to share the spectrum that did result in some problems with frequency coordination, that has led to these interference problems that we're experiencing. So I think to the extent that we are able to utilize the frequency coordination process to take a look at what people are doing, you have the cooperation of the community, (a) to provide systems that cover their jurisdiction without reaching far beyond that

and yet do provide coverage for their own jurisdiction.

We really don't have a problem. Where we've gotten into trouble is when people don't want to play the game.

MR. LARSON: Thank you. Andrew the same question from your perspective.

DR. CLEGG: From our perspective, being in the mobile, wireless mobile industry, I think I'd like to start with an example of where I think things worked pretty well because it might help in modeling how things are done in the future. And that is the PCS spectrum and the technical rules that were adopted on the PCS spectrum.

Back in the 1994 time frame when that spectrum was just being built out after the auction, it was recognized that the Commission had a rational clearing policy in place for that band and that band would basically be cleared by a relatively certain date and at a cost that was relatively straightforward for the operators to calculate. So the fact that we needed the spectrum